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between the Cape and St. Helena, and consequently not far from either of those stations.

As far as I have yet been able to examine, I have found that the same remarkable peculiarity does exist at all other stations which are near this line, and at none which are remote from it. But however this may be, the accordance of the phenomena at the Cape of Good Hope and St. Helena, and their dissimilarity from those at other stations is a well-ascertained fact, of far too much bearing and importance to be passed without notice; and we may safely anticipate that its cause must occupy a prominent place in the theory which shall be ultimately received, as affording an adequate solution of the problem of the diurnal variation.

Believe me, my dear Sir, sincerely yours,

EDWARD SABINE.

*S. H. Christie, Esq., Secretary to the Royal Society.*

May 24, 1849.

The EARL OF ROSSE, President, in the Chair.

The following papers were read:—

1. An appendix to a paper "On the Variations of the Acidity of the Urine in the State of Health"—"On the Influence of Medicines on the Acidity of the Urine." By Henry Bence Jones, M.D., M.A., F.R.S. &c.

The variations of the acidity of the urine in the state of health having been shown in the original paper, and the effect of dilute sulphuric acid also traced; in this appendix, the influence of caustic potash, of tartaric acid, and of tartrate of soda, on the acidity of the urine is determined.

One ounce of liquor potassæ, specific gravity 1072, was taken in distilled water, in three days. It hindered the acidity of the urine from rising, long after digestion, to the height to which (from comparative experiments) it otherwise would have done; but it, by no means, made the urine constantly alkaline; nor did it hinder the variations produced by the state of the stomach from being very evident.

354 grains of dry and pure tartaric acid dissolved in water were taken in three days. The conclusion from the observations is that this quantity increased the acidity of the urine, but during that time it did not render the effect of the stomach on the reaction of the urine less apparent than when no acid was taken; and therefore, that this quantity of tartaric acid, during this time, does not produce so much effect on the reaction of the urine as the stomach does.

Tartrate of potash in large doses produces the most marked effect on the alkalescence of the urine. 120 grains of pure dry tartrate of potash dissolved in four ounces of distilled water made the urine alkaline in thirty-five minutes. In two hours the alkalescence had

disappeared, but after the next meal the effect of the tartrate of potash was again apparent. 10 drachms of tartrate of potash taken in three days produced but little, if any effect, on the acidity of the urine twenty-four hours after the last dose was taken.

2. "On the direct production of Heat by Magnetism." By W. R. Grove, Esq., M.A., V.P.R.S. &c.

The author recites the experiments of Messrs. Marrian, Beatson, Wertheim and De la Rive on the phenomenon made known some years ago, that soft iron when magnetized emitted a sound or musical note.

He also mentions an experiment of his own, published in January 1845, where a tube was filled with the liquid in which magnetic oxide had been prepared, and surrounded by a coil; this showed, to a spectator looking through it, a considerable increase of the transmitted light when the coil was electrized.

All these experiments the author considers go to prove that whenever magnetization takes place a change is produced in the molecular condition of the substances magnetized; and it occurred to him that, if this be the case, a species of molecular friction might be expected to obtain, and by such molecular friction heat might be produced.

In proving the correctness of these conjectures difficulties presented themselves, the principal of which was, that with electro-magnets the heat produced by the electrized coil surrounding them, might be expected to mask any heat developed by the magnetism. This interference, after several experiments, the author considers he entirely eliminated by surrounding the poles of an electro-magnet with cisterns of water, and by this means and by covering the keeper with flannel, and other expedients, he was enabled to produce in a cylindrical soft-iron keeper when rapidly magnetized and demagnetized in opposite directions a rise of temperature several degrees beyond that which obtained in the electro-magnet, and which therefore could not have been due to conduction or radiation of heat from such magnet. A series of experiments with this apparatus is given.

By filling the cisterns with water colder than the electro-magnet, the latter could be cooled by the water while the keeper was being heated by the magnetization.

The author subsequently obtained distinct thermic effects in a bar of soft iron placed opposite to a rotating permanent steel magnet, using a delicate thermo-electrical apparatus placed at his disposal by Mr. Gassiot.

To eliminate the effects of magneto-electrical currents, the author then made similar experiments with non-magnetic metals and with silico-borate of lead, substituted for the iron keepers, but no thermic effects were developed.

He then tried the magnetic metals nickel and cobalt, and obtained thermic effects with both, and in proportion to their magnetic intensity.

Some questions of theory suggested by the above experiments